REMARKS

Applicant thanks the Examiner for his attention to the present application. The application and the cited reference have been carefully reviewed.

The description of the present invention set forth in the previous response is provided in a footnote for the convenience of the Examiner.[1]

Rejections under 35 U.S.C. §102(e)

Claims 1, 7, 8, 12, and 13 stand rejected under 35 U.S.C. 102(e) as being anticipated by Fahlsing (US 6,588,499). For a rejection under 35 U.S.C. 102(e) to stand, each element of the rejected claim must be found in a single reference.

Fahlsing is contrary to the present claims in at least the following aspects:

1. Fahlsing measures a bulk or ambient temperature rather than a surface of the heat transfer wall or heat exchanger; and
2. Even if Fahlsing is construed to measure the temperature of a surface of the heat transfer wall or heat exchanger, Fahlsing measures the opposite surface than is recited in the present claims.

1. FAHLSING MEASURES A BULK OR AMBIENT TEMPERATURE RATHER THAN THE SURFACE OF THE HEAT TRANSFER WALL OR HEAT EXCHANGER

The Examiner asserts Fahlsing discloses "directly monitoring (99) the temperature of the first surface of the heat transfer wall (column 10, lines 50-65)". [Paper 5, page 3].

[1] The invention, in brief, concerns a method and apparatus for operating a heat exchanger that avoids certain problems associated with fluid to be cooled (the "cooled" fluid) freezing onto the heat transfer surface. Such problems particularly occur where a cryogenic fluid such as liquid nitrogen is used as the "cooling fluid" so there is a real likelihood of the cooled fluid freezing onto the heat exchange surface.

Should the cooled fluid begin to freeze on the cooling surface, the insulating effect of the resulting ice layer alters properties of the heat exchanger that may not be detected simply by monitoring the temperature of the cooled fluid.

In accordance with the present invention, the problems are addressed by monitoring the temperature of the heat transfer surface in contact with the cooled fluid rather than the temperature of the cooled fluid itself. The flow of either the cooled fluid or the cooling fluid is then adjusted in response to this temperature.

In a preferred embodiment, flow adjustments are made when the temperature of the surface in contact with the cooled fluid falls to a temperature that is at least 50° F colder than the freezing temperature of the cold fluid.

However, Fahlsing does not measure a surface of the heat exchanger, but rather a surrounding air temperature. Referring to Figure 3 of Fahlsing, the temperature sensor 99 is spaced from the condenser tube 15:

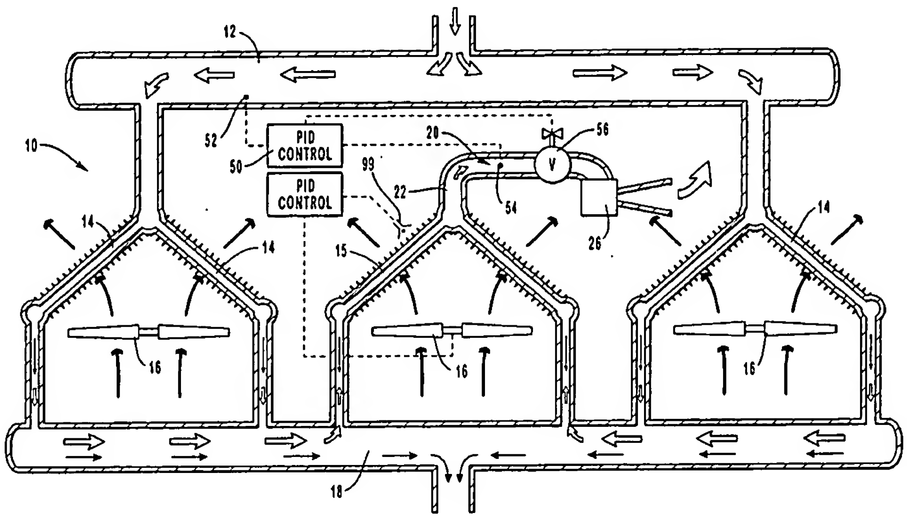

FIG. 3

The temperature monitoring of Fahlsing does not "directly monitor" the temperature of the first surface of the heat transfer wall. Rather, the temperature sensor 99 is on the outside of the condensing tube in the air flowing over the exterior of the tube. The temperature sensor 99 monitors the ambient or bulk temperature of the ambient air (cooling fluid), and not the surface of the condensing tube 15.

Specifically, in Column 10, Fahlsing states:

> The present invention also provides means for monitoring and maintaining the exit tube exterior air temperature of the condensing tubes **15** at ambient temperature, when ambient temperature is about or below freezing to minimize fan power requirements and facilitate freeze protection. In one embodiment of the present invention, a thermocouple or similar temperature sensor **99** may be disposed on the outside of condensing tube **15** in the air flowing over the exterior of tube **15**, near the junction with the AES headers **22** as shown in FIG. **3**. Sensor **99** is positioned about three-fourths of the way up the tube **15**. If the temperature of the air passing over condensing tube **15** is greater than the ambient air temperature, this indicates that steam is probably reaching the end of the condensing tube **15** and possibly passing into the air ejector system **20**. Therefore, when the tube exterior temperature reading as measured by temperature sensor **99** is above ambient temperature, the fan speed is increased thereby lowering the temperature of the con-

While Fahlsing states "temperature sensor 99 may be disposed on the outside of condensing tube 15", this does not mean the temperature sensor measures the surface of the condenser tube. This text locates the temperature sensor 99 outside of, not inside of, the condensing tube 15. Referring to the remainder of the text, the temperature sensor 99 is on the outside surface of the condensing tube 15 "in the air flowing over the exterior of tube 15". This clearly indicates the temperature sensor 99 is outside rather than inside the condensing tube 15 and is located "in the air flow flowing over the exterior of the tube" rather than attached to the surface of the condensing tube 15 and measuring the surface of the tube.

The specification of Fahlsing further supports this construction. Specifically, in Column 6:

> condensing and to regulate pressure in the AES **20**. When the ambient temperature is above water-freezing temperature, the D-section fan speed can be regulated to minimize fan power requirements. Fan speed can be regulated by measuring and maintaining the temperature of the air which has passed over the exterior of the tubes and cooled the tube bundle. If the temperature of the air being blown by the fans across the exterior of a tube bundle is greater than a desired temperature or in other words, if the temperature of the air passing across the exterior of the condenser tube **15**, measured by temperature sensor **99**, is greater than a desired value or given set point, the fan **16** associated with that section speeds up, lowering the tube exterior air temperature. If the tube exterior air temperature is lower than the desired air temperature set point, suggesting that condensing tube **15** is being sub-cooled, the fan **16** slows down and the tube exterior air temperature increases. In short, using a tube exterior air temperature set point, the elevation of the zone of last condensation can be controlled using fan speed. The tube exterior air temperature set point used to minimize fan power requirements by controlling the elevation of the zone of last condensing can also be used to regulate the

This section of Fahlsing states:

"when the ambient temperature is"

"measuring and maintaining the temperature of the air which has passed over the exterior of the tubes and cooled the tube bundle"

"if the temperature of the air being blown by the fans across the exterior of a tube bundle"

"if the temperature of the air passing across the exterior of condenser tube 15"

"if the tube exterior air temperature is lower"

"using a tube exterior air temperature set point"

"the tube exterior air temperature set point"

Applicant submits this discloses monitoring the temperature of the blown air, not the surface of the condensing bundle 15.

Therefore, the recited "directly monitoring the temperature of the first surface of the heat transfer wall" (Claims 1, 7, and 8) and "monitoring means for directly monitoring

the temperature of the first surface of the heat transfer wall" (Claims 12 and 13) are not disclosed by Fahlsing.

The lack of at least this limitation precludes Fahlsing for sustaining the asserted rejection under 35 U.S.C. § 102.

2. EVEN IF FAHLSING IS CONSTRUED TO MEASURE THE TEMPERATURE OF A SURFACE OF THE HEAT EXCHANGER, FAHLSING MEASURES THE OPPOSITE SURFACE THAN IS RECITED IN THE PRESENT CLAIMS

If Fahlsing is construed to measure the surface temperature of the heat exchanger, Fahlsing measures the opposite surface than is recited in the present claims.

In Fahlsing, steam (cooled fluid) passes from the exhaust steam header 12 through steam condensing tubes 14, through the second steam header 18, and then through condensing tubes 15 to then pass from the air injector 20. Ambient air (cooling fluid) is selectively passed over the condensing tubes 14 and 15 by respective fans 16. The steam (cooled fluid) passing through the headers 12, 18 and the condensing tubes 14, 15 has a higher temperature than the cooling ambient air (cooling fluid) moved by the fans 16 across the outside of the condensing tubes 14, 15.

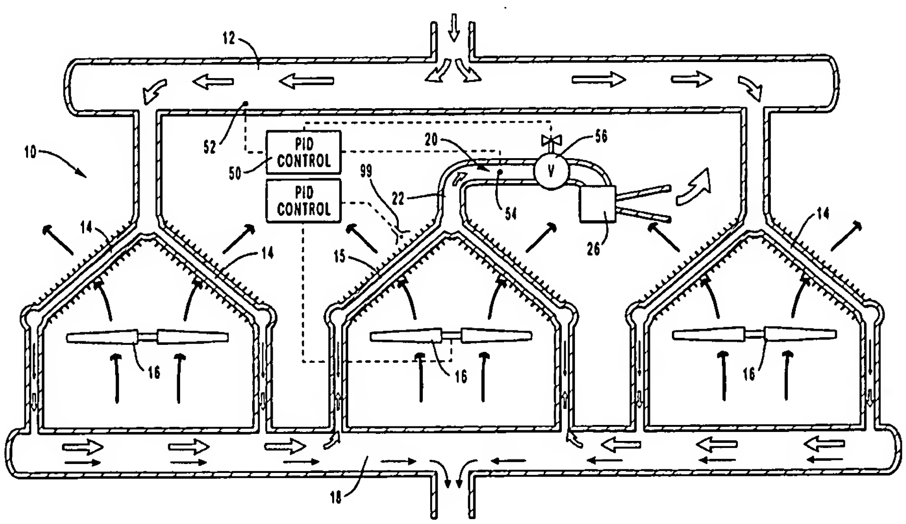

FIG. 3

In Fahlsing, the cooled fluid is the steam which travels through the internal passages of the headers 12, 18 and the condensing tubes 14, 15, while the ambient air is the cooling fluid passing over the exterior or outside surface of the condensing tubes 14, 15.

In contrast, the present claims recite in part "passing a cooled fluid in contact with the first surface of the heat transfer wall... directly monitoring the temperature of the first surface of the heat transfer wall" (Claims 1, 7, and 8); and "the housing having a heat transfer wall with a first surface for contacting the cooled fluid... monitoring means for directly monitoring the temperature of the first surface of the heat transfer wall" (Claims 12 and 13).

If the temperature sensor 99 is construed as measuring the surface of the condensing tube 15, then pursuant to Fahlsing, the temperature measurement taken through sensor 99 is of the *cooling fluid*, the ambient air. The *cooled* fluid, the steam, passes on the interior of the headers 12, 18 and the condensing tubes 14, 15 and is not measured in Fahlsing. Thus, the surface contacting the cooled fluid is not measured by Fahlsing.

As Fahlsing fails to disclose these recited limitations, Claims 1, 7, 8, 12, and 13 are believed to distinguish over the cited reference.

Rejections under 35 U.S.C. §103

Claims 2, 9, 10, and 14 stand rejected under 35 U.S.C. 103 as being unpatentable over Fahlsing (US 6,588,499).

The Examiner asserts Fahlsing discloses all of the claimed limitations from these claims except the specifically recited "adjusting" the flow and "restoring" the first flow rate in response to the recited temperature differential. The Examiner asserts it would have been obvious to modify the freeze protection system of Fahlsing by reducing the flowing or restoring the flow to "provide a wide range of freezing temperatures wherein the system is protected from freezing". [Paper 5, page 5].

As set forth above, applicant respectfully asserts that the temperature measurement of the ambient air does not disclose the recited measuring (monitoring) of the presently recited surface of the heat exchanger (or tube wall). Further, even if Fahlsing is construed to measure the surface of the heat exchanger, Fahlsing measures the *cooling* fluid surface of the heat exchanger, rather than the recited *cooled* fluid surface of the heat exchanger.

The Examiner's assertion that it would have been obvious to modify Fahlsing to "provide a wide range of freezing temperatures wherein the system is protected from freezing" does not cure these deficiencies. Therefore, the asserted rejection of Claims 2, 9, 10, and 14 cannot be sustained.

In view of the comments as set out above, Applicant considers that all the pending claims, Claims 1-15, are in condition for allowance, which action is respectfully requested.

Respectfully submitted,

Brian B. Shaw, Registration No. 33, 782
HARTER, SECREST & EMERY LLP
1600 Bausch & Lomb Place
Rochester, New York 14604
Telephone: 585-231-1193
Fax: 585-232-2152

Dated: January 28, 2004